RESPONSE

The Applicant has amended Claims 1 and 8. Support for the amendment can be found on page 13, lines 1- 11, and elsewhere, of the subject Specification. The Applicants further note that Claims 17 and 18 have not been rejected. Accordingly, the Applicants submit that it would appear that said claims are allowable.

The rejection of Claims 1 – 3, 7, 8 – 11, 16 and 19 under 35 U.S.C. 103(a) as being unpatentable over Laub et al. (U.S. 3,790,738) is respectfully traversed.

The Examiner takes the position that Figs. 2 and 7 and the discussion at column 4, lines 35 -60 and at column 7, line 59 through column 8, line 5 disclose the subject matter claimed except for an explicit discussion of an arrangement for converting electric power into a low voltage, high amperage electric flow. The Examiner believes that this difference does not patentably distinguishes the subject invention as claimed over the prior art. The power source (36) in Laub et al. is clearly powered by a.c. line current (Fig. 2 and the line labeled "AC" connected to element 36). The Examiner further takes the position that although not explicitly disclosed, it is considered obvious that the power source (36) in Laub et al. includes an arrangement to convert the a.c. line current into a low voltage, high current output because the electrodes (30) in Laub et al. are applied directly across a high conductivity workpiece which would require that the output be low voltage, high current as claimed.

The Applicants respectfully submit that Laub et al. discloses a new pulsed heat eutectic bonder. A pulse of heating current is applied to a substrate or first workpiece through electrodes and a bonding tool is driven by a solenoid-permanent magnet combination with a unidirectional back-and-forth **scrubbing action** to achieve a reliable eutectic bond. It appears that precise control of time, temperature, and scrubbing is what enables the disclosed eutectic bonder to accomplish optimum eutectic bonding conditions (col. 2, lines 31 – 39). Localized heat is applied to the first work piece by means of heating electrodes (30) which bracket tool (28) which work in cooperation with longitudinal vibratory or "scrubbing" motion applied to the pickup and bonding tool arm (32) to

achieve eutectic bond of the die and the substrate (col. 4, lines 16 – 21). The heating electrodes are located and arranged so as to contact the first work piece immediately adjacent two sides of the chip (second work piece) to achieve localized heating of the area to which the chip (second work piece) is attached (col. 4, lines 31 – 35). It is the simultaneous application of heat and scrubbing action produces an eutectic bond of chip (second work piece) to the substrate (first work piece, col. 6, lines 7 – 9 and elsewhere).

The Applicants further submit that as shown in Laub et al., the heating electrodes are each in contact with the **same** workpiece (FIG. 4) and an eutectic bond is formed by heating the first workpiece such that two or more materials in the joint diffuse together to form an alloy composition that melts at a lower temperature than the base materials. For example, this type of bonding is often used to form a bond between two wafers by coating one of the wafers with one component of the system and the other wafer with the second component. When the wafers are heated, the materials along the interface diffuse and alloys are formed. The eutectic composition alloy at the interface has a lower melting point than the materials on either side of it, and hence melting is restricted to a thin layer.

As disclosed in Laub et al., the electrodes are both connected to **only one** of the work pieces, such as the substrate, and it appears that the electrodes are heated and scrubbing action is applied such that the **scrubbing action at the interface between the workpieces or substrates or wafers plus the general heating of the work piece or substrate around the interface, raises the temperature along the interface to diffuse a material**, often with the help of a foil such as a gold foil, having a lower melting temperature than the substrate material, causing it to diffuse and bond the work pieces together.

As provided in independent Claim 1, comprises "at least two electrodes adapted for attaching to and providing electrical contact with the work pieces to be brazed together whereby one electrode is attached to a first work piece and the other electrode is attached to a second work piece such that electrical power can travel through and between all of the work pieces" and in independent Claim 8,

comprising "at least two electrodes adapted for attaching to and providing electrical contact with the work pieces to be brazed together such that electric power can travel through all of the work pieces"

Accordingly, the subject invention operates by a *substantially different manner*. Unlike eutectic bonding whereby electrodes are attached to **only one of the work pieces** to be bonded and are used in cooperation with scrubbing action to increase the heat of a work piece having a diffusing material to bond two work pieces together, the present invention is a brazing operation uses a low voltage, high current electric flow whereby the **electrodes are attached such that electric power travels through the work pieces** such that the temperature increases along the *high resistance interface* between two work pieces causing the material along the interface to melt and fuse together. Accordingly, the electrodes do not need to be places near the area to be heated since *the heating is caused by the relatively high resistance interface*. Unlike the subject application whereby electrodes are connected to the different work pieces and electric power is used to directly heat the component material along the high resistance interface, in Laub et al., the electrodes are attached to the same workpiece (**thus an essential feature of the invention as claimed in independent claims 1 and 8 is nowhere shown in the reference**), it appears that in Laub et al. the *electrodes (30) themselves are heated* (Figs. 2 and 6B) thereby causing the heating of the eutectic material. Thus, the method of bonding taught by Laub et al. is functionally and structurally different than that claimed in the subject application.

The Applicants further submit that the rejection of Claim 19 is improper as it is depended on a non-rejected base claim. If independent Claim 17 has not been rejected, the Applicants respectfully submit that dependent Claim 19 can not be rejected under the current rejection.

In view of the foregoing, the Applicants respectfully submit that the rejection of Claims 1 – 3, 7, 8 – 11, 16 and 19 under 35 U.S.C. 103(a) as being unpatentable over Laub et al. (U.S. 3,790,738) should now be withdrawn.

The rejection of Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Laub et al. as applied to Claims 1 – 3, 7, 8 – 11, 16 and 19 and further in view of Weinbrecht (U.S. Patent No. 4,960,975).

The Examiner takes the position that it would have been obvious to have used any well known approach to implement the control functions taught by Laub et al. The Examiner believes that it would have been obvious to have used a microprocessor as claimed, the motivation being the teachings of Weinbrecht that the use of a microprossor for controlling a brazing type system is advantageous (see Fig. 4, element 8 and the discussion thereof in Weinbrecht).

The Applicants restate the arguments made hereinabove with respect to Laub et al. While a microprocessor may be utilized to control the processes of the cited references, the Applicants submit that the method and apparatus disclosed and claimed are significantly different than that disclosed in the cited references. Accordingly, the control system is also functionally and structurally different than the control system disclosed in Weinbrecht when applied to the device of Laub et al.

In view of the foregoing, the Applicants respectfully submit that the rejection of Claim 4 under 35 U.S.C. 103(a) as being unpatentable over Laub et al. should be withdrawn.

The rejection of Claims 5, 6, 12 – 15 and 20 under 35 U.S.C. 103(a) as being unpatentable over Laub et al. as applied to Claims 1 – 3, 7, 8 – 11, 16 and 19 above, and further in view of Abe (U.S. Patent No. 5,286,945) is respectfully traversed.

The Examiner takes the position that the only aspect of the Claims to which the rejection does not apply is the provision for water cooled electrodes. The Examiner believes that this difference does not patentably distinguish over the prior art. The Examiner states that at the time Applicant's invention was made, it would have been obvious to have used water cooled electrodes, the motivation being the teachings of Abe that such are advantageous in a brazing type system (see FIG.

6 and the discussion thereof in column 6 of Abe).

The Applicants submit that the method and apparatus taught in *Laub et al. would not operate or would not operate properly by using water cooled electrodes.* Indeed, we submit that the use of water cooled electrodes would prevent the electrodes of Laub et al. to heat to the temperature necessary to melt the eutectic material and therefore teaches away from the use of cooled electrodes. Further, the electrodes of the present invention are cooled *while performing the brazing operation* so that heating only occurs along the high resistance interface. In contrast, as taught by Abe, after *the workpieces are heated and the solder has melted over the junction between the workpieces and the current supply between the electrode rods has stopped,* then the electrodes are cooled (col. 2, lines 20 – 26). Thus, it appears that the sole purpose of such cooling is to quickly cool the molten solder *after the boding process* thereby shortening the operating cycle time of the soldering work (col. 2, lines 27 – 30). Therefore, it is our opinion that the advantage of cooling electrodes, such as taught in the present application, is nowhere taught in the cited references and does not render the subject invention obvious. Indeed, as previously stated, it would not be desirable to cool the electrodes of Laub et al. and therefore **teaches away** from the subject invention.

In view of the foregoing, the Applicants submit that the rejection of Claims 5, 6, 12 – 15 and 20 under 35 U.S.C. 103(a) as being unpatentable over Laub et al. as applied to Claims 1 – 3, 7, 8 – 11, 16 and 19 above, and further in view of Abe (U.S. Patent No. 5,286,945) should be withdrawn.

Conclusion:

The Applicants respectfully submit that there is nothing in the cited references that clearly suggests the claimed invention. The Applicants are not claiming individual elements, but rather their new relationship together. The Applicants further submit that the seemingly minor changes from the prior art produces a beneficial and improved method and apparatus of brazing not contemplated or taught by the prior art.

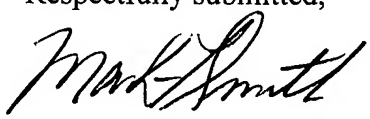
It is well known in patent law that it is not enough to show that each separate element of the claimed invention can be found in one or more prior art references. There must be something to suggest the desirability of the proposed combination and the incentive to combine the cited references cannot be found from a hindsight examination of the subject specification.

While the reference patents disclose methods and apparatus for bonding two materials together, it is our opinion that to modify the methods disclosed therein along the lines of the subject application would require **significant modifications to the apparatus and methods disclosed in the references** which are not contemplated therein. It is well settled that obviousness is based upon what the prior art taken as a whole would suggest to one of ordinary skill in the art. This is true even if all the elements of a claim are disclosed in the various references. The mere fact that one may select and rearrange various elements disclosed in the prior art to arrive at the claimed invention does not support a claim for obviousness unless there is some motivation to combine the references. Such a motivation cannot be found in the Applicant's own specification, but must be shown by evidence that *is clear and particular*.

As previously stated and shown herein, to combine and modify the cited references along the lines of the claimed invention would require significant changes to the method disclosed therein. Indeed, the fact that the apparatus and their method of operation are so significantly different than that of the invention of subject application, operates to teach away from the claimed invention.

In view of the foregoing remarks, it is respectfully submitted that all of the Claims now pending are now allowable over the art of record. Reconsideration of all claims now in this application is respectfully requested.

Respectfully submitted,



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